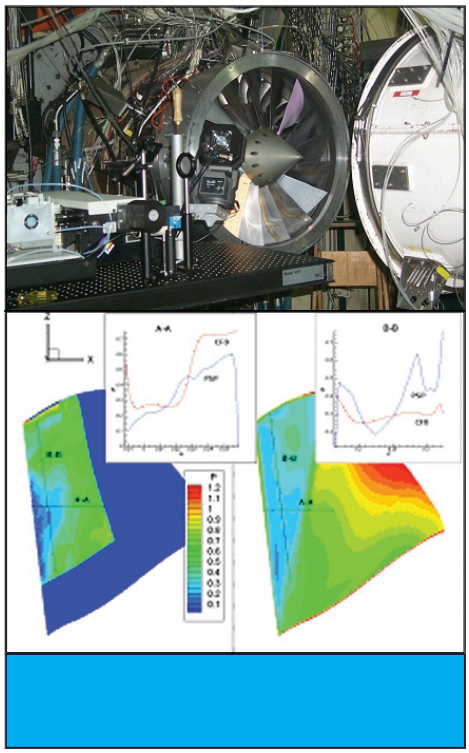
Air Force Research Laboratory|AFRL

Science and Technology for Tomorrow's Air and Space Force

Success Story

SMALL BUSINESS PARTNER WINS GOVERNOR'S EMERGING TECHNOLOGY AWARD



The State of Ohio awarded a Governor's Emerging Technology Award to Innovative Scientific Solutions, Inc. (ISSI), a small business working with the Propulsion and Air Vehicles Directorates' pressure sensitive paint (PSP) technology development program. Their significant development will lead to far less costly data collection of pressure points on aerodynamic bodies in both high- and low-speed and pressure applications. Both government and commercial enterprises will benefit from this achievement.

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Accomplishment

The government and small business partnership developed a PSP that was far less sensitive to temperature changes and extended the applicable speed range of the new measurement technique. Under this program, researchers obtained pressure data from an aerodynamic body at a record-breaking low speed of 27 miles per hour (mph). This program also leads the field in the development of PSP technology for applications in rotating machinery.

Background

PSP is a micro-porous paint that changes luminescent intensity as a function of the pressure. With PSP, an aerodynamicist can obtain a visual, global pressure map of the surface without disturbing the flow field or adding costly/time-consuming instrumentation.

Prior to this accomplishment, PSP had several deficiencies, such as a signal-to-noise limitation that restricted the ability of PSP in applications with very low speeds, and in high-pressure applications such as turbomachinery. Also, the sensitivity of PSP to temperature contributed to unacceptably high errors in the pressure data.

The newly developed PSPs drastically improved signal-to-noise and reduced temperature sensitivity, increasing the range of applications of this new technology. To accomplish this, the ISSI/AFRL partnership developed an entirely new PSP system based on fluorinated polymer chemistry, new paint method applications, ultra stable light sources, and scientific-grade imaging systems for obtaining the raw pressure data.

The new paint formulation and improved data acquisition system adequately resolve pressure fields from aerodynamic bodies performing at speeds as low as 27 mph, making the system a valuable tool for automotive/general transportation applications. The technique can also acquire surface pressure data from a state-of-the-art transonic turbomachine. ISSI engineers also developed new software to graphically display the raw intensity data, convert the intensity data into pressure, and transfer the quantitative pressure map onto a three-dimensional mesh representative of the aerodynamic body.

Propulsion
Awards and Recognition

Additional information

To receive more information about this or other activities in the Air Force Research Laboratory, contact TECH CONNECT, AFRL/XPTC, (800) 203-6451 and you will be directed to the appropriate laboratory expert. (02-PR-03)